

## Claims

1. A system for assessing blood volume of a patient, comprising:  
an imaging device for capturing images of the patient's retina as pixel data; and  
a processor in communication with the imaging device, wherein the processor compares the pixel data to a database to determine if the patient is at risk of vascular collapse.
2. The system according to claim 1, wherein the processor measures a vasculature characteristic from the pixel data.
3. The system of claim 1 wherein the processor measures non-vascular tissue from the pixel data.
4. The system according to claim 1, wherein the imaging device captures images of the retina from a region around the patient's optical disk.
5. The system of claim 2 wherein the vasculature measurement comprises measuring arterial vessel diameter.
6. The system of claim 2 wherein the vasculature measurement comprises measuring venous vessel diameter.
7. The system of claim 2 wherein the vasculature measurement comprises measurements of arterial and venous vessel diameters.
8. The system of claim 7, wherein a ratio of venous diameter to arterial diameter is calculated from the pixel data, and the ratio is compared to the database to determine if the patient is at risk of vascular collapse.
9. The system of claim 1 wherein the pixel data is obtained from a user-defined area on the retina.
10. The system according to claim 9 wherein the user-defined area is toroidal in shape.
11. The system according to claim 9 wherein the user-defined area is circular in shape.
12. The system according to claim 1 wherein the imaging device comprises a CCD-based camera for capturing images of the patient's retina.

13. The system according to claim 1 wherein the imaging device comprises a MOS based camera for capturing images of the patient's retina.
14. The system according to claim 1 wherein the imaging device comprises a single element detector.
15. The system according to claim 2 or 3 wherein the processor outputs an alert if the measurements are below or above a predetermined range of values.
16. The system of claim 1 wherein the processor distinguishes between vascular and non vascular tissues.
17. The system of claim 1, wherein the processor distinguishes between arterial vessels, venous vessels, and non-vascular tissues.
18. The system of claim 1 further comprising an output device.
19. The system of claim 18, wherein the output device is selected from a laptop monitor, a desktop computer monitor, a television screen, a PDA, a printing device, and a pager.
20. The system according to claim 1 further comprising a light source.
21. The system according to claim 20, wherein the light source is selected from the group consisting of a light emitting diode, an incandescent light bulb, a flash lamp, and a laser diode.
22. The system of claim 1 wherein the data is captured at a center wavelength in the range of about 400nm to about 1000nm.
23. The system of claim 1 wherein the data is captured at a center wavelength in the range of about 500nm to 700nm.
24. The system according to claim 20 wherein the light source provides light having a center wavelength in the range of about 400nm to about 1000nm.
25. The system according to claim 20 wherein the light source provides light having a center wavelength in the range of about 500nm to about 700nm.
26. The system of claim 1 further comprising an optical assembly.
27. The system of claim 1, wherein the system is portable.

28. A method for assessing blood volume of a patient, comprising:  
capturing images of the patient's retina as pixel data using an imaging device;  
using a processor to calculate measurements of retinal vessels from the pixel data; and  
comparing the calculated measurements with a database to determine if the patient is at risk of vascular collapse.
29. A method according to claim 28 further comprising the step of outputting an alert if the measurements are below or above a predetermined range of values.
30. The method of claim 28 further comprising the step of using spectrometry to distinguish arterial vessels, venous vessels and non-vascular tissue.
31. The method of claim 28 wherein the step of comparing the calculated measurements with a database to determine if the patient is at risk of vascular collapse further comprises using a database comprising patient specific data obtained from the patient before or after the injury, or data from individuals with a known risk of vascular collapse.